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EXAMINER	
NAJMUDDIN, RAZA NEHAL	
ART UNIT	PAPER NUMBER
4136	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/552,140	GAERTNER, UWE	
	Examiner	Art Unit	
	RAZA NAJMUDDIN	4136	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claim Objections

1. Claim 31 is objected to because of the following informalities: The last line states "device as a function of the measured concentration" should be corrected to "device as a function of the measured oxygen concentration. It should also be clarified whether "a define oxygen concentration" in claim 30, line 3 is different from the measured oxygen concentration as stated in claim 30, line 2. The examiner believes that the two concentrations as mentions above are different concentrations and has treated it as such.

2. Claim 32 is objected to because of the following informalities: The claim states "this signal" in line 6 which the examiner recommends should be changed to "the said oxygen concentration" for further clarification.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

   a. A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 12-14, 15-17, 18-20, 21-23, 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matekunas (US 4621603) in view of Daudel et al. (US 6826471) and Walter et al. (US2001/0002587 A1).

5. Matekunas describes control device for controlling the operation of an internal combustion engine from combustion chamber pressures measure a few predestined crankshaft rotational angles during the engine cycle. Matekunas further describes that fuel flow may be balanced among the combustion chambers for and even air/fuel ratio (col. 2, line 30-37).

6. Matekunas does not describe determining the mean gas temperature in cylinder during a combustion in the combustion chamber, calculating the gradient of the mean gas temperature and calculating the NOx level based on the mean gas temperature or the gradient of the mean gas temperature.

7. Daudel et al. describes that the gas temperature is decisively dependent on the center of gravity of combustion (col. 2, lines 41-42) and that can center of gravity of combustion is preferably effected by measure the combustion chamber pressure profile (col.2, lines 51-53). Daudel et al. also state that it is advantages to monitor maximum

pressure (col. 2, lines 60-64). Daudel et al. also describes calculating the NOx level based on the local temperature (col. 2, lines 26-33).

8. Daudel et al. does not describe determining the mean gas temperature in the cylinder during a combustion.

9. Walter et al. discloses that combustion chamber pressure signal can further be evaluated such as differentiated and averaged (Pr 6).

10. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the teaching Matekunas about controlling an internal combustion engine and specifically the control of air and fuel with the teachings of Daudel et al. and Walter et al. for the following reasons: Matekunas teaching for the use of pressure sensor can be combined further in view of Daudel et al. which teaches calculating the gas temperature from the pressure profile because it well know that pressure and temperature are related through the ideal gas law (Matekunas, col. 3, equation 4). Matekunas and Daudel et al. and further in view of Walters et al. which teaches mean pressure or the derivative (gradient) of the pressure signal. The teachings can be combined because it is advantageous to do so as stated by Walter (Pr 6, lines 8-10). The mean pressure or the derivative of the pressure signal will result in

mean gas temperature or derivative of gas temperature respectively, as taught by Daudel et al.

Regarding claim 13, which states that maximum value of the mean gas temperature can be used, see Daudel et al. (col. 2, line 63-64) which states that maximum pressure can be used for fault detection and setting the operation mode. Since pressure can be used to get gas temperature, maximum pressure will result in maximum gas temperature.

Regarding claim 14, which states that NOx level is determined using the mean gas temperature when intake valve is closed and/or a final compression temperature in the combustion chamber, see Matekunas (col. 2, lines 47-49). Matekunas (col. 2, line 47-49) states that motored pressures may be derived from the combustion chamber pressure sensed at a predetermined crankshaft angle prior to combustion. Prior to combustion is when the compression is the final compression.

Regarding claims 15-17 teach that claims 12-14 respectively wherein the mean gas temperature is determined within a defined crank angle range, see Matekunas (col. 5, line 5-11) which states the mass burn rates increases linearly with crankshaft rotational angle up to the

50% mass burned point and then decreases linearly to the end or combustion. Crank angles ranging from -10 to 40 degrees are also listed in which the mass burn was plotted (40-45).

Regarding claims 18-20, which states claims 12-14 respectively wherein determining a quantity of a reducing agent for downstream exhaust gas after treatment system based on the untreated nitrogen oxide emission level which has been determined, see Daudel et al. (col. 4, line 48-49) which teaches that the NOx level can be used to control and regulate exhaust-gas after treatment system.

Regarding claims 21-23, which state claims 12-14 respectively wherein the metered quantity of fuel is injected into the combustion chamber in such a manner that at least one of a predetermined gradient of the mean gas temperature in the combustion chamber, and a predetermined position of the maximum value for the mean gas temperature, is established in the combustion chamber, see Daudel et al. (col. 2, lines 56-63) which states it is also possible to use a dedicated model for a calculating the center of gravity from the start of injection to determine the center of gravity of the combustion.

Regarding claims 27-29, which state claims 12-14 respectively wherein an exhaust gas recirculation quantity for setting a defined

oxygen concentration in the combustion chamber is set as a function of a combustion center of gravity, see Matekunas (col. 1, lines 31-34) which states that a control system is possible using combustion chamber pressure sensors and applying feedback control to ignition timing, dilution gas rate and fuel rate.

11. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matekunas (US 4621603) in view of Daudel et al. (US 6826471), Walter et al. (US2001/0002587 A1) and Hiltner (US 6425372 B1).
12. Claim 24-26 state 12-14 respectively, wherein the metered quantity of fuel is injected into the combustion chamber in such a manner that a combustion center of gravity is established at a defined crank angle position.
13. Hiltner teaches (col. 5 lines 24-27) the control of fuel rate and also mentions that various crank angle positions can be measured and then matched with various pressure readings that are measured in the combustion chamber (coulomb 4, line 46-52). It has been previously stated that pressure signal is related to the center of gravity of combustion. It can then be concluded that the fuel rate can be controlled to get a specific pressure at a defined crank angle their by getting the center of gravity a defined crank angle.

14. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the teachings of Matekunas, Daudel and Walter and further in view of Hiltner to improve combustion efficiency which in turn affects the generation of NOx level (Hiltner, col. 4, lines 26-27).

14. Claims 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matekunas (US 4621603) in view of Daudel et al. (US 6826471), Walter et al. (US2001/0002587 A1) and Baldwin et al. (US 20030034018 A1).

15. Claim 30 states claim 12, wherein a drop in the oxygen concentration which is required for nitrogen oxide reduction is calculated form the calculated untreated nitrogen oxide emission level, so that an exhaust gas recirculation device is set such that, after combustion air has been mixed with recirculation exhaust gas, a defined oxygen concentration is produced in a cylinder charge upstream of or in the combustion chamber.

16. Baldwin et al. teaches (Para. 32, lines 7-10 and also Fig 6) which state the desired oxygen exhausted may be determined from a map which has been empirically established which indicates desired rated oxygen as a function of desired emission levels.

17. It would have been obvious to a person having ordinary skill in the art at the time the invention was made that teachings of Matekunas,

Daudel and Walter can be modified further in view of Baldwin et al. because oxygen level effect NOx level (Baldwin et al. Pr 28, lines16-26). With the teachings of Baldwin (Para. 32, line 7-10, and Fig 6) the EGR in Daudel et al. can be set accordingly.

18. Claims 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matekunas (US 4621603) in view of Daudel et al. (US 6826471), Walter et al. (US2001/0002587 A1) and Nishida (4823760).
19. Claim 31 states claim 12, where in oxygen concentration of the combustion air before it enters the combustion chamber is measured by means of oxygen sensor; and a defined oxygen concentration of the combustion air upstream of or in the combustion chamber is set by means of the exhaust gas recirculation device as a function of the measured concentration.
20. Nishida teaches (abstract, lines 7-10) an use of oxygen sensor for detecting the concentration of oxygen in the intake air after recirculating the exhaust gas to the air intake system.
21. It would have been obvious to a person having ordinary skill in the art at the time the invention was made that teachings of Matekunas, Daudel and Walter can be modified further in view of Nishida because it helps operate the engine a optimum condition (Nishida, abstract, line 13).

22. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matekunas (US 4621603) in view of Daudel et al. (US 6826471), Walter et al. (US2001/0002587 A1), Nishida (4823760) and Baldwin et al. (US 2003/0034018 A1)

23. Claim 32 states claim 12, wherein oxygen concentration of the exhaust gases after the exhaust gases have emerged from the combustion chamber is measured by means of an oxygen sensor; oxygen concentration of the combustion air before it enters the combustion chamber is calculated from this signal, an exhaust gas recirculation rate and a measured combustion air quantity; and a defined oxygen concentration of the combustion air upstream of or in the combustion chamber is set by means of the exhaust gas recirculation device, as a function of a the calculated concentration.

24. Baldwin et al teaches the use of oxygen sensing device in the exhaust stream of the engine (Pr 18, line 2-3) for the purposes of controlling NOx level.

25. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the teachings of Matekunas, Daudel and Walter, further with the teachings of Nishida and Baldwin because it helps control the emission level (Baldwin, Para. 6) and helps operate the engine operate at the optimum condition (Nishida, abstract). The teachings can be combined to

control and exhaust gas recirculation (EGR) system (Nishida, col. 1, lines 40-45)

CONCLUSION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAZA NAJMUDDIN whose telephone number is (571)270-1225. The examiner can normally be reached on M-F, 7:30am-5pm, alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marvin Lateef can be reached on 571-270-1493. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Rm
4/27/09

/Marvin M. Lateef/
Supervisory Patent Examiner, Art Unit 4136